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Títol de Treball Final de Grau: **Introduction of financial data in the XBRL standard**

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First of all, I want to thank the project tutors Roberto García and F. Xavier Ruiz del Portal. Special mention to R. García as this project is made based on his proposal and for all the help and patience given during the implementation process. I want to thank also my family, girlfriend, friends and everyone who has been by my side throughout this project.

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Chapter 1

Introduction

The business sector has been immersed in a digitalization process since the 1980s, when the computer became a familiar machine, and is an ongoing process. *The Digital Revolution, as this digitalization is known, makes reference to the advancement of technology from analog electronic and mechanical devices to the digital technology available today* [1]*. Furthermore, this revolution led way to the Information Age, also known as Information Era* [2]*..*

In consequence of this new period that we are living on, customers expect to have their needs, a new sort of them, fulfilled by all the existing companies, such as having a seamless user experience, seeing real-time information or having their problems solved in matter of minutes. Therefore, businesses have changed the way they used to work in order to keep up with this new modern world.

Working with machine-readable data is one of the features that businesses have had to implement in their software. But actually, nowadays, there are many companies that are still working with printed or hand-written documents. Of course, this type of working has its advantages, but future will give better opportunities for those who have preferred the change to traditionalism. One of the advantages of machine-readable data is the possibility of analyzing and examining them through analytical and management applications. These frameworks examine huge amounts of data to disclose hidden patterns, correlations and other insights. Then, organizations can use it to improve their decision making, reduce costs or develop new personalized products or services. This analysis can not be done without having structured, machine-readable data.

Based on the previous ideas: the digitalization, taking advantage from the data that companies dispose and improving the performance and productivity of businesses, XBRL international developed the iXBRL standard. In a similar approach, the aim of this project, which will be described in more detail later, is to create a web framework, using the XBRL standard as a basis, that can

[1] `https://www.techopedia.com/definition/23371/digital-revolution`

[2] An era where information is the main strategic resource upon which individuals, organizations, and societies rely for their growth and development.(`https://www.igi-global.com/dictionary/information-society-discourse/36120`, 22/04/2018)

help medium and small companies to digitalize their financial reports.

1.1 Motivation

The main reason of choosing this proposal is the idea of working on something that really synthesizes both degrees. On one side, developing a web framework covers the computer engineering part, and supposes a great challenge as it is the first time that I have to face a project of this scope. Moreover, the framework and the tools used during the project are new for me, what meant an extra dedication to get familiar with those and domain them in order to achieve the desired result. On the other side, doing an exhaustive research of the standard covers the business and administration part, as well as making a project plan to follow during the project.
The other reason to decide on this project is to create a solution for medium and small companies, that do not have enough resources to digitalize their businesses. Not having technical knowledge or having a tight budget can suppose a drawback in their digitalization process. This problem is reflected principally in small towns, such as mine, where most of the companies are family-driven ones, and can not keep on because it is a big deal to face up to.
For that reasons, the proposal is attractive to me and I am determined to take it forward.

1.2 Objectives

One of the stages at the beginning of a project is to settle down the main objectives of the project. In this case, the objectives need to be achievable and realistic due the mixed topics that this project contain.
The main objective is to became familiar with a web development software, such as Angular, and have a good command of its main features, as well as learning the programming languages that constitute the XBRL standard, like XML and HTML.
Another objective of the project is to research, learn and understand the scope of the standard. Knowing the five W of the standard (why, what, who, when, where and optional how) will give a better approach of the topic and will help to achieve with more accuracy the final desired result.
Finally, the last objective is to follow an agile methodology, which bases its structure on iterations, and accomplish the deadlines established at the beginning of the project, when the timing was made.
Through the accomplishment of this objectives, the yearning result can be ensured and as a developer of the project I will feel fulfilled.

1.3 Value of the project

In order to define the scope of the project, is very important to define where, when and for who the project will have value. "In which countries will the project be available?", "When will it be launched?" or "Which sector or sectors will be the beneficiaries of the final product?" are some of the questions that a project manager needs to answer. This process is crucial to define all the requirements to fulfill, as you can not know exactly all the needs that a product has to cover if you do not know the target sector in which you will work on.
In the case of this project, the target sector is that of SME (Small and medium-sized enterprises) of Spain, launching the final product on June, 2018. This is because, as it was mentioned before, the aim of the project is to help this kind of companies to digitalize its financial documents. *The Colegio de Registradores (Association of Spanish Business Registrars) works with the Banco de España to provide a standardized bank credit score to SMEs. The score is based on XBRL company filings from the business registrar combined with benchmark data from across the EU*[3]. Therefore, companies that can not fill their reports with XBRL tags because of varied reasons, such as having a tight budget that does not allow to hire a qualified worker for that kind of tasks or enterprises that do not have the technical knowledge to fulfill their reports with XBRL tags, have a disadvantage in the bank credit score, which can suppose a drawback for the management of the company. Here is where this project have value and why it has been developed. Finally, the date of launch has been decided after establishing a project timing, which will be described later.

1.4 Structure of the project

The project will be divided in 2 main parts: the first one describes the tasks performed in the field of business administration and management and the second one describes the tasks performed in the field of computer engineering.
Business Administration and Management, which is the chapter 2, is constituted by the following sections:

- History of the Standard XBRL: past, present and future
- XBRL around the world
- Utilities of XBRL
- Advantages and Disadvantages of XBRL
- Social Responsibility of XBRL

The Computer engineering, which corresponds to chapter 3, is constituted by the following sections:

- Methodology of the project, Project timing and Budget of the project

[3] `https://www.xbrl.org/the-standard/why/xbrl-for-business-registrars/`

- List of Iterations
- Future Work

The project finishes with the conclusion section and the annex.

1.5 State of the art

Figure 1.1: Logos of the technologies used to develop and implement the project.

1.5.1 The XBRL standard

According to its website `https://www.xbrl.org/the-standard/what/an-introduction-to-xbrl/`:
XBRL is the open international standard for digital business reporting, managed by a global not for profit consortium which operates in the public interest, XBRL International. Its purpose is to improve the accountability and transparency of business performance globally, by providing the open data exchange standard for business reporting. XBRL is used around the world, in more than 50 countries, and there are some governments planning to introduce it as the reporting standard for all the companies, organizations and institutions of their countries. Millions of XBRL documents are created every year, replacing older, paper-based reports with more useful, more effective and more accurate digital versions.
In a nutshell, XBRL provides a language in which reporting terms can be authoritatively defined. Those terms can then be used to uniquely represent the contents of financial statements or other kinds of compliance, performance and business reports. Moreover, XBRL lets reporting information move between organizations rapidly, accurately and digitally.
The international XBRL consortium is supported by more than 600 member organizations, from both the private and public sectors. XBRL is used in many different ways, for many different purposes, including by:

- Regulators
- Companies

- Governments
- Data providers
- Analysts and Investors
- Accountants

Some of the most important features of XBRL are:

- Clear Definitions, called taxonomies, which capture the meaning contained in all of the reporting terms used in a business report.
- Testable Business Rules, that constrain what can be reported.
- Multi-lingual Support
- Strong Software Support

Summarizing, this new format allows the users to do all the things that used to be possible, but also opens up a range of new capabilities because the information is clearly defined, testable and in a digital format. This project is based on the standard XBRL, taking it as the central point to work on, and focusing the project main objective on the creation of a web framework that embeds XBRL tags into the HTML ones.

1.5.1.1 Basics of XBRL

Developers and users in general, need to understand a few of the basics of XBRL to not underestimate the size of the standard and all the features that are covered by it. According to its website `https://www.xbrl.org/the-standard/how/getting-started-for-developers/`:

- Concept: definition of a term that needs to be, or might be, disclosed in a particular domain (e.g. Profit is a concept that is often disclosed in a business domain).
- Taxonomy: XBRL taxonomies are the meta-data framework against which information can be reported. It captures the meaning contained in all of the reporting terms used in a business report, as well as the relationships between all of the terms.
- Data: From an XBRL perspective, the **values** reported against this meta-data are just that, or occasionally even an encoded value like a picture or a chart. But that **value-concept** pairing is not meaningful unless the data is provided with additional information which is provided by some **context** (period, currency, etc). By combining a concept from a taxonomy with a value and the needed context we arrive at a **fact**. Collections of facts in XBRL are contained in documents called **instances**. Instance documents are the XBRL based reports.

- Dimensions: allow organizations to report multiple values against the same concept. They are an additional kind of meta-data, that can be defined in taxonomies and then applied to instances as an additional piece of context.

- Extensions: taxonomies can be extended in order to modify the relationships between existing concepts, or to add new concepts to an existing taxonomy. Extension taxonomies are separate documents that import the base taxonomy and override certain aspects of the original.

1.5.1.2 XBRL at present

XBRL is currently on version v2.1, which has remained stable since its launch, and the only changes that have been done to this version are for errata corrections. Although, the standard has evolved significantly through the development of additional XBRL modules or XBRL Specifications, which define new, compatible functionalities. The specifications that have achieved the Recommendation status, meaning they are stable and are considered suitable for broad adoption and implementation, are the following ones[4]:

- *Dimensions (Recommendation 18 September 2006 with errata corrections to 25 January 2012) - This specification allows XBRL taxonomy authors to define and restrict dimensional information that instance authors may use in the ¡segment¿ and ¡scenario¿ elements of the ¡context¿ element of XBRL instance documents. Said in other words, it provides a generalized mechanism to define dimensional meta-data and to reference it in XBRL instances.*

- *Extensible Enumerations (Recommendation 29 October 2014) - This specification allows domain member networks, previously used for dimensions, to constrain the allowed values for primary reporting concepts, enabling taxonomy authors to define extensible enumerations with multi-language labels.*

- *Formula (Recommendation 22 June 2009) - It defines a syntax for formulae that can be processed to produce XBRL facts in an output XBRL instance from information obtained from XBRL reports and their supporting meta-data. Another definition is: a XBRL formula specifies validations based on XBRL instance facts and generation of derived data as output XBRL instance facts.*

- *Generic Links, Labels and References (Recommendation 22 June 2009) - XBRL 2.1 uses the XLink specification to define a syntax for between certain XBRL components, and defines a number of built-in link types with prescribed semantics and constraints. Generic Links 1.0 generalizes this by providing a link type with no predefined semantics or constraints. This can be used used as a building block for other specifications, such as*

[4] `https://specifications.xbrl.org`

Generic Labels 1.0 and Generic References 1.0 to define relationships with particular semantics.

- *Generic Preferred Label (Recommendation 08 May 2013) - The lack of the preferred label mechanism of presentation relationships, for base sets of other standard and generic relationships, makes it awkward to fully utilize these XBRL base sets when presentation relationships are not required. This specification provides a facility to use the preferred label mechanism on all relationships.*

- *Conformance test definition (Recommendation 22 June 2009) - This specification defines a syntax for a generic conformance suite test. Specific types of tests will need to customize this generic conformance suite test to support documentation of the specific inputs and outputs being tested.*

- *XBRL Registry Specification (Recommendation 22 June 2009) - This specification defines a syntax for an XML document that contains location information about entries in a registry. This specification is intended to support the creation maintenance and publication of XBRL-related registries, including the XBRL function registry.*

- *Inline XBRL or iXBRL (Recommendation 18 November 2013) - This specification provides a mechanism for embedding XBRL tags in HTML documents. This allows the XBRL benefits of tagged data to be combined with a human-readable presentation of a report, which is under the control of the preparer. The latest version of the specification is iXBRL 1.1..* This specification will be explained in more detail later.

- *Registries - A key feature of XBRL is extensibility, allowing implementers significant freedom to build mold solutions to specific requirements. In order to ensure that such extensions are done consistently, and to avoid unnecessary reinvention of similar extensions, XBRL provides a number of registries. These registries provide a centralize list of definitions, allowing implementers to re-use suitable definitions created by others. Although use of the registries is not compulsory, re-using definitions wherever possible will promote interoperability.*

- *Versioning (Recommendation 27 February 2013) - It defines an XML syntax for an XBRL Versioning Report. A Versioning Report can be used by the authors of XBRL taxonomies to provide documentation of the changes between two taxonomies.*

- *Taxonomies (Recommendation 19 April 2016) - For convenience XBRL taxonomies are typically distributed as ZIP files, with accompanying human-readable documentation describing which of the component files should be considered entry points. This specification defines a standard format and location for a manifest file that can be included in such ZIP files that allows compliant tools to identify the entry points automatically.*

- *Table Linkbase (Recommendation 18 March 2014 with errata corrections to 09 March 2016 - This module allows taxonomy authors to define tabular reporting templates.*

1.5.2 iXBRL or Inline XBRL

There is a clear need to publish financial and business information both in human-readable and machine-readable formats. With the growth of interest in using the XBRL standard to transmit information in a machine-readable format, it has become necessary to create an extension to the XBRL standard which will tie the machine-readable data to co-existing human-readable formats. Inline XBRL provides a mechanism for taking financial and business information formatted in HTML, the universal language for web browsers, and adding to it hidden meta-data which can be used to construct a machine-readable copy of the same information. That extracted, machine-readable, information is fully compliant with the XBRL standard and can be used by regulators and other consumers of financial information.
Therefore, we can define the iXBRL as an open standard that enables a single document to provide both human-readable and structured, machine-readable data. Is used to prepare financial statements in a format that provides the structured data that regulators and analysts require, whilst allowing preparers to retain full control over the layout and presentation of their report.
iXBRL takes the HTML standard that is used to power the world's web pages, and embeds extra "tags" (using XML code) into it that give meaning to the figures and statements in a format that can be understood by a computer. This process is what our web framework does to the external reports that users introduce into it. So, it can be concluded that the project is based on this specification of the XBRL standard. [5] [6]

1.5.3 Angular

Angular is a TypeScript-based open source web platform, led by the Angular Team at Google and by a community of individuals and corporations, that makes it easy to build applications with the web. Angular combines declarative templates[7], dependency injection[8], end to end tooling[9], and integrates best

[5] `https://www.xbrl.org/the-standard/what/ixbrl/`

[6] `https://specifications.xbrl.org/spec-group-index-inline-xbrl.html`

[7] Declarative programming is a non-imperative style of programming in which programs describe their desired results without explicitly listing commands or steps that must be performed.

[8] Dependency Injection (DI) is a way to create objects that depend upon other objects. A Dependency Injection system supplies the dependent objects (called the dependencies) when it creates an instance of an object.

[9] It refers to the separation of concerns between the presentation layer (front end), and the data access layer (back end) of a piece of software, or the physical infrastructure or hardware. In the client–server model, the client is usually considered the front end and the server is usually considered the back end, even when some presentation work is actually done on the server.

practices to solve development challenges. Angular also empowers developers to build applications that live on the web, mobile or desktop.
In this project, Angular is used along with the code editor Visual Studio Code to implement the web framework

1.5.4 TinyMCE

TinyMCE (Tiny Moxiecode Content Editor) is a platform-independent, browser-based WYSIWYG editor control, written in JavaScript and released as open-source software under the LGPL by Ephox. It has the ability to convert HTML text-area fields or other HTML elements to editor instances.
In this project, the main page of the web framework uses a TinyMCE instance to work with the reports of the users. Actually, all the functionality of the project is done using this HTML on-line editor.

Chapter 2

Study of the XBRL Standard

The following chapter describes the theoretical part of the project. In other words, the research of information about topics such as XBRL's history, who uses it around the world, advantages and disadvantages of the standard, alternatives in the market and its social responsibility is going to be described. This section constitutes the previous step of learning about the standard before beginning with the practical part. It is fundamental to know the scope of the standard and all the information related with it as it is the basis of the project.

2.1 History of the standard XBRL: past, present and future

2.1.1 Past

The history of XBRL is relatively short, and it is traced back to 1998. In that moment, Charles Hoffman, who was working as a CPA[1] with the firm Knight Vale and Gregory in Tacoma, Washington, decided to investigate XML in order to digitize reporting of financial information. Charlie began developing prototypes of reports using XML, and later, informed Wayne Harding, chairman of the AICPA[2] High Tech Task Force, about the potential of using XML in this new field.
The AICPA High Tech Task Force created a "Product Description" proposing the creation of a prototype set of financial statements using XML. Wayne Harding presented the results to the AICPA Committee, and consequently, the AICPA determined to fund the project.
C. Hoffman was in charge of the first prototype that was developed. In addition,

[1] CPA: Certified Public Accountant
[2] AICPA: American Institute of Certified Public Accountants

the AICPA requested a business plan, which was called XFRML, to be prepared to look into the business case for XML's financial statements. On July, 1999 the AICPA Board of Directors determined to finance the XRFML effort.
12 companies joined the business plan along with the AICPA as members of the XFRML Steering Committee. Some of this companies were Deloitte & Touche LLP and Microsoft Corporation. The AICPA began implementing the business plan on August, 1999 and the financial statements of various companies were created to further test the concept of XML's financial statements.
The first meeting of the XFRML Steering Committee took place on October, 1999. The name was changed to the XBRL on April, 2000. Finally, on July 2000 the XBRL announced the launch of the first specification for United States companies: "XBRL for Financial Statements". [3]

2.1.2 Present

Nowadays, the specification that is currently in use is the "XBRL 2.1 Specification", which was released the December 31, 2003 with errata correction on February, 2013. The specification went through several versions prior to XBRL v2.1[4]:

- *1.0 - Published in July, 2000. This version was based on DTDs*[5]*. It expressed the difference between data exchange in instance documents and meta-data exchange in taxonomy documents. Taxonomies were expressed as XML Schema files, but these were not used for instance validation.*

- *2.0 - Ambiguous publishing. This version introduced use of XML Schema substitution groups as a way of allowing schema validation of instances. Concept relations were broken out into separate XLink-based linkbases. Context in the isntance was collected into a separate element.*

- *2.1 - Published in December, 2003. This version tightened the definition of terms significantly, allowing for the introduction of a conformance suite.*

2.1.3 Future

The future of XBRL[6] [7] [8] is based on programs and initiative of the regulators, companies and institutions. On 2017, XBRL was used by more than 100 regulators in more than 60 countries and in an increasing number of corporations to

[3] http://xbrleducation.com/edu/history.htm
[4] https://www.aicpa.org/InterestAreas/FRC/AccountingFinancialReporting/XBRL/DownloadableDocuments/XBRL_09_web_final.pdf
[5] DTD: Document Type Definition. A DTD defines the structure and the legal elements and attributes of an XML document.
[6] https://www.sec.gov/news/pressrelease/2016-117.html
[7] https://www.xbrl.org/briefing-sec-shift-to-ixbrl/
[8] https://www.esma.europa.eu/policy-activities/corporate-disclosure/european-single-electronic-format

facilitate structured data reporting, according to XBRL International. Furthermore, Hans Hoogervorst, chairman of the International Accounting Standards Board, estimates that 60 percent of financial statement data is being consumed electronically, and it's expected to grow.
An example of these initiatives is the possibility of being able to present quarterly and annual financial statements in Inline XBRL to US listed companies by the Securities and Exchange Comission (SEC) till 2020. Acorrding to the Comission's thougth, the use of Inline XBRL will provide a wide range of benefits to companies and users of financial information. A decrease of filing preparation costs, an improvement of the quality of structured data and an increase of the use of XBRL data by investors and other market participants are some of the potential benefits. Consequently, the EDGAR [9] system has been upgraded and updated to facilitate the use of Inline XBRL.
This effort by the SEC has an international importance as it provides an example for other security regulators and stock exchanges, accelerates the transformation and digitalization of financial reporting, and cast more attention on the need to develop procedures around the XBRL documents.
Another example is the European Single Electronic Format (ESEF) impulsed by the European Securities and Markets Authority (ESMA). ESEF is the electronic format in which issuers on EU regulated markets must prepare their annual financial reports from 1 January 2020. This electronic format is based on XBRL, as its IFRS consolidated financial statements contained in the annual financial reports shall be labelled with XBRL tags, and the these XBRL tags shall be embedded in the XHTML document using the Inline XBRL technology.
As result of this initiative, ESMA has prepared an ESEF reporting manual to provide an harmonized and consistent guidance to the issuers, which are requested to prepare the financial reports in Inline XBRL, and to software firms, which are request to develop software used for the preparation of annual financial reports in Inline XBRL. The purpose of this guidance is to solve common issues encountered when generating Inline XBRL instance documents[10].
Finally, the XBRL organization is continuously improving the standard and the specifications. Some of enhancements that need to be done to solve the drawbacks that are delaying the widespread use of the XBRL standard are: a needed improvement of the data's reliability, improvement of the consumption tools to allow users to access the data without disruptions to current work-flows, Significant reduction to error rates of the standard, improvements to the underlying taxonomy for simplification and easier utility and focusing on getting state of the art tools for consumption. The specifications that are under development nowadays are the *Extensible Enumerations* from 1.0 to 2.0 and the *Table Linkbase* from 1.0 to 1.1. Moreover, the consortium is working on new

[9] Electronic Data Gathering, Analysis, and Retrieval system, performs automated collection, validation, indexing, acceptance, and forwarding of submissions by companies and others who are required by law to file forms with the U.S. Securities and Exchange Commission (SEC).

[10] `https://www.aicpa.org/interestareas/frc/accountingfinancialreporting/xbrl/evaluationofcurrentandfuturestateofxbrl.html`

projects[11]

1. Open information model: provides a syntax-independent model for XBRL data, allowing reliable transformation of XBRL data into other representations (JSON, CSV, XML).
2. Ordering of networks and root nodes.
3. Streaming extensions: provides a mechanism for constructing an XBRL instance document in a manner that makes it possible to consume efficiently as a stream of facts
4. Abstract model: presents an abstract meta-model for the semantics that have been defined in the XBRL 2.1.

[11] `https://specifications.xbrl.org/specifications.html`

2.2 XBRL around the world

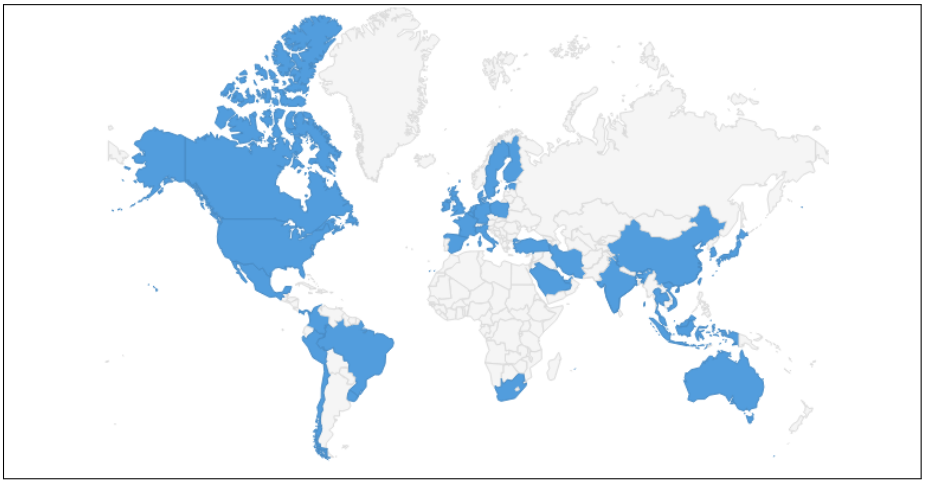

Figure 2.1: Map where XBRL is in production use around the world.

XBRL is evolving everywhere, but obviously, the developed countries have put more effort in this process due to various important figures such as governments, stock exchanges, the XBRL organization around the world, institutions, banks and other industry sectors, which have driven the evolution of the standard with many XBRL initiatives. This section focuses on the regions that have been and will be more important for the standard, such as Europe, United States, South-America and Asia [12] [13].

2.2.1 Europe

Europe has developed the XBRL standard for a different use in comparison to U.S and Asia. A government-wide and cross-border applications that can share consistently structured XBRL data. The adoption in Europe has been divided in 3 separated waves, that constitute a fully usage of this standard and exploitation of it.
The first wave was in 2003, when various stakeholders from the private and public sector worked together to develop XBRL taxonomies suitable for their data.
The second wave came as XBRL International's specification was released for commercial use in 2004. The Spanish central bank has a special mention due to its work done on Basel II[14] and, in consequence, the Committee of European

[12] https://www.journalofaccountancy.com/Issues/2008/Oct/XBRLAroundTheWorld.htm
[13] https://www.xbrl.org/the-standard/why/who-else-uses-xbrl/
[14] Basel II is an international business standard that requires financial institutions to maintain enough cash reserves to cover risks incurred by operations. The Basel accords are a

Bank Supervisors started using XBRL for Basel II reporting across all 27 member states.
Finally, the third wave of XBRL development was started by the European Comission in 2004, when concerned with the disparity of taxonomies and various standards being ussed by its member states, pushed them to register their taxonomies with XBRL Internation and to work on a truly open standard.
The following list is a selection of the most important XBRL systems placed in Europe:

- NBB Annual Financial Statement (Belgium: 400,000 companies): The National Bank of Belgium is responsible for the preparation of the Belgian national accounts. To assist in this process, Belgian companies provide a template balance sheet in XBRL format to the central bank on an annual basis. The data is used for statistical purposes but each company's filing is also freely available in XBRL for individual use.

- Danish Business Authority (Denmark: 210,000 companies): Since The Danish Business Authority has required all Danish businesses to provide either in XBRL format or iXBRL format, a digitally signed version of their annual financial statements for the purposes of registration and market information. The XBRL/iXBRL data is available for purchase from the agency.

- HMRC Corporate Tax Returns (United Kingdom: 2.2 million filers): The UK's tax authority, HM Revenue & Customs, requires all corporations tax filings to be provided in iXBRL format.

- Companies House Financial Statement Filing (United Kingdom: 1.5 million filers): The UK's companies registry, Companies House, requires all UK companies to file financial statements annually. Since 2006 Companies House has had a voluntary XBRL filing mechanism in place and since 2011, companies have been able to file in iXBRL.

- Spanish Business Register (Spain: 700,000 filers): Since 2008, all Spanish corporations are required to file annual financial statements with the Business Register. These filings are made publicly available online.

- German E-Bilanz (Germany: 1.35 million filers): Starting with a pilot in 2011, German corporate taxpayers are required to digitally file returns in E-Bilanz format using a wide range of industry specific taxonomies.

- European Banking Authority COREP/FINREP (European Union: 30 countries): The European banking reporting process is comprised of two stages, with banking institutions reporting supervisory data to their relevant national or supranational regulatory authorities and subsequently those authorities remit that data to the European Banking Authority.

series of recommendations on banking laws and regulations issued by the Basel Committee on Banking Supervision (BSBS). `https://whatis.techtarget.com/definition/Basel-II`

2.2.2 United States

While Europe focuses on XBRL for use in government and cross-border applications, U.S. focuses on XBRL for use in capital markets. Capital markets in United States are quite more difficult to work on because various factors, such as the existing huge number of stakeholders in the financial supply chain, the highly development of the U.S. accounting standards, the complexity of the corporate reporting requirements or the granularity and contextualization of the U.S. companies information.
Campbell Pryde, chief standards officer for XBRL U.S. says: "The U.S. is the largest, most-developed capital market in the world, and no country has implemented XBRL to the extent that the SEC has proposed for U.S. equity markets. The U.S. is taking a very progressive and carefully documented approach, and if it has taken this long to "go live," it's because of the enormity of the task. From a capital market perspective, the U.S. has far more technical, legal and infrastructure issues to overcome than smaller countries". For that reason, the SEC effort on the development and integration of XBRL standard has been recognized internationally. The following list describe the two most important initiatives in United States:

- SEC Interactive Data (United States of America: 7,000 public company filers): The SEC obliges US issuers (listed companies and securities, including mutual funds) to file financial statements. Companies must provide 3 quarterly filings (10-Q) and 1 annual filing (10-K) to the regulator's EDGAR filing system. The data is used by the SEC to analyse the company's compliance with disclosure obligations, as well as to identify anomalies and outliers that could point to accounting fraud. The data is republished in XBRL format and made freely available to market participants, of particular use for a range of groups including data vendors, research firms and analysts.

- FFIEC Call Reports (United States of America: 6900 filers): The FFIEC obliges US banks to provide quarterly "call reports" in XBRL format. Call reports cover a range of financial condition and financial risk measures. Almost all of this data is republished via the Uniform Bank Performance Reports, including in XBRL format. FFIEC data is used by US banking regulators as well as the public to analyse the relative health of individual banks.

2.2.3 South-America

South-America has focused its XBRL initiatives on both sectors, banking and business reporting. After a considerable effort of the institutions and governments of this region, most of the south-american countries have integrate XBRL as the standard for reporting. It exist an extensive list of initiatives that are under development and some initiatives that are currently in use, which are the following ones:

- Project SICONFI (Brazil: Federal government, 26 States and 5570 municipalities): Project SICONFI collects data for an annual report known as the National Public Sector Balance (BSPN), a set of financial and budgetary statements that show the economic condition of the Brazilian Federation as a whole, as well as that of Federal, State and Local Governments, as well as for a set of tables known as Finances of Brazil (FINBRA), which contains accounting and budgetary information for each entity in the Federation in a unified format. The Treasure utilizes XBRL for efficient collection and to improve data quality.

- SVS Listed Company Filing (Chile: 270 companies): The Chilean securities regulator ("La Superintendencia de Valores y Seguros") or "SVS" requires listed companies to file IFRS based financial statements on a quarterly basis in XBRL. The data is republished on their web site in XBRL and can be used by global market participants including data vendors, investors and analysts.

- Peru Superintendency of Securities (Peru: 177 companies): Mandatory filing began in 2012 for listed companies, which use templates in Excel to record, validate and generate reports in XBRL .

- Panama Banking Supervision (Panama: 78 banks): The project began in 2012 with the aim of improving data collection and transparency. Four filings are required: Balance Sheet, Statement of Profit and Loss, Cash Flow and Comprehensive Income and Changes in Equity. XBRL reports are publicly available from the SPB website.

- Mexican Securities Regulation (Mexico: 143 companies): During the first phase of the project the BMV in coordination with the CNBV collects basic financial statements, including statement of financial position, income statement, cash flows and changes in equity, in XBRL, which are then published on the BMV website. For the second phase, a new extended taxonomy with 890 elements was published.

- Colombian Financial Supervision and Colombian Business Registrar (Colombia: 1000 companies): The Colombian Business registrar requires the submission of balance sheet, profit/loss and cash flow statements though XBRL Express, its on-line portal that feeds information into the Integrated Financial Reporting System SIRFIN.

2.2.4 Asia

Finally, in Asia, XBRL is used in capital markets. China has become the country that leads the integration, development and adoption of XBRL reporting. One of the reasons that settles this leadership is that in 2004, China became the first country to formally adopt XBRL reporting for its equity markets. Furthermore, Chinese innovation continues to lead XBRL into new fields like risk profiling, data mining and communicating text information along with financial

data.
A positive point that has done China able to move quickly towards this new standard is that companies didn't actually switch to XBRL reporting, and therefore, companies didn't spend time learning this new reporting method. They continued to fill out the same forms they always used, while reporting software translated line items into XBRL data. Although, one of the drawbacks that Asia needs to face is that Asian XBRL taxonomy has extended themselves into isolation. It do not exist a broader oversight and, unlike the EU, Asia does not have a central authority that can mandate cross-border interoperability to their taxonomy developers. Many Asian developers hope the effort of SEC on creating a consistent taxonomy in United States will have a positive influence in harmonizing taxonomy development worldwide. Going further, Asia has developed and eye-opening array for future XBRL applications working against financial fraud. Global Business Intelligence Consulting Co. is developing software to automatically search for irregular behaviors in XBRL databases.
Some of the XBRL initiatives in the Asian region are:

- Bank Indonesia Islamic Banking Regulatory Reporting System (Indonesia: 571 filing entities): Bank Indonesia collects monthly financial statements from 34 Islamic banks, based on Sharia financial rules. Filers validate and send XBRL instance documents directly to BI. The data is used for supervisory purposes.

- Japan Financial Services Agency Next Generation EDINET (Japan: 4,500 companies and 3,500 investment funds): Since June of 2008 the JFSA has required XBRL filing of Annual Securities Reports, Semiannual Securities Reports, Quarterly Securities Reports and Securities Registration Statements. The next generation EDINET has introduced Inline XBRL and the expansion of mandatory reporting to include material facts as well as financial information.

- Korea DART system (South Korea: 58,000 filing entries): South Korea's on-line DART system has over 58,000 XBRL entries from both private and public companies dating back to 2007 available to download in XLS format.

2.3 Advantages and disadvantages of XBRL

[15] [16] [17] [18] [19] [20] The adoption of XBRL by companies, governments and regulators has been into debate during a long time, with as many detractors as there are supporters around the world. The purpose of this section is to describe the main benefits and potential uses of the standard XBRL, as well as the disadvantages of the implantation of this standard.
Let's start with the cons of the XBRL, as it is where this project is valuable. Most of the disadvantages of the standard take place during the implantation of it. Inexperienced users, initial costs, inconsistencies, security problems and inappropriate taxonomy extensions are some of the problems that users of XBRL need to face.

- Inexperienced users: not all accountants or other business sector workers have familiarity with XBRL. This standard is complex and not easily read or written by accountants, regulators or business users, necessitating the dependence on experienced IT developers to assist with the electronic filing. For many small and medium sized companies it is impossible to hire more staff, specially the qualified one, for budget reasons, or to teach their workers for time availability reasons. Letting unexperienced users work with XBRL data increases the percentage of errors. There are two main types of errors: wrong tag selection from a taxonomy and development errors during the implantation. Both of them lead to a lack of confidence on this system and, consequently, the disuse of it. One solution is to outsource the XBRL tagging work to a third party, specialized on this field, but this outsourcing goes along with increased costs, such a negative point to take into account. At this point is when this project takes value due to it provides a tool, which is easy to learn and use for every worker, that accomplish with the basic XBRL tagging. Companies will be able not only to meet the requirements that regulators ask them, but also to take advantage of the wide range of benefits that this standard has.

- Emphasize short term results: this is consequence of the almost real time disclosure of information. Some detractors of the standard think that financial information shared in a real-time way may cause undue volatility in stock prices and impulsive decisions by investors, business managers, etc. The potential to quickly report financial information in automated ways may emphasize short-term results at the expense of long-term objectives.

[15] https://www.aicpa.org/interestareas/frc/accountingfinancialreporting/xbrl/benefitsandpotentialusesofxbrl.html
[16] https://ca.xbrl.org/xbrl-benefits/
[17] https://www.xbrl.org/the-standard/what/the-standard-for-reporting/alternative-formats/
[18] http://xbrl-reporting.blogspot.com.es/2011/02/some-of-pros-and-cons-of-xbrl.html
[19] http://eminencejournal.com/images/pdf/J4.pdf
[20] https://www.techwalla.com/articles/disadvantages-of-using-xbrl

- Cost: as it was mentioned before, justifying the initial costs of XBRL tagging may be difficult for some companies. Unless a company have an automated tagging process, XBRL consumes many hours of labor for non-experienced users. Some experts affirm that, over time, XBRL could lead up to a 25 percent decrease in costs and an important opportunity cost that companies could invest on, but the idea of outsourcing at the initial stages of the implantation or revamp their reporting system at huge costs defeats the cost-cutting benefits associated with XBRL. This is another reason why this project is valuable, because its cost for the companies will be insignificant in comparison to the advantage they will take.

- Security: using Internet as a network is one of the major issues of the standard. Any system on Internet is vulnerable to attacks by viruses and focuses attacks by hackers. Moreover, because XBRL data remains available at all times, it requires more security to maintain its integrity. These rigorous security demands not only affect security breaches initiated outside of the company's system, but also security breaches from within the company as well.

- Taxonomy extensions: one of the distinctive features of the XBRL is its extensibility. One of the reasons why companies extend a taxonomy is to add a new element that describes better an amount or a concept. These taxonomy extensions are appropriate in most of the cases, but it can be inappropriate when they over use it, deriving the resulting instance document in a non-standard, incomparable document between companies in the same industry.

- Company transparency: this point needs to be considered from various approaches. XBRL takes away a company's ability to "hide" financial tricks in the books. Even if it is illegal to do such things, it is well known that some companies take advantage of hand-written documents to take some profit. Therefore, from a regulator point of view, it is a good way to make the companies follow the rules and laws, but, from a company point of view, is a drawback for its financial tricks. This aspect will be discussed more extensively in the section: Social Responsibility of XBRL.

After describing the "bad side" of the XBRL, now it is time to describe the benefits and potential uses of XBRL. The benefits are seen in automation, cost saving, faster, more reliable and more accurate handling of data, improved analysis and in better quality of information and decision-making. Moreover, XBRL is beneficial for a variety of stakeholders: investors can use it to facilitate analysis of financial results, companies can use it to eliminate manual input and to review of information passed through the financial reporting process, and governmental entities can use it to efficiently collect business information. Let's point out some of the major benefits of XBRL standard.

- Universality: XBRL is an universally accepted information exchanging language. This standard is available across many countries and facilitates

the exchange of financial information in many languages, on virtually any computer platform and in multiple accounting standards. This strong support of big companies, world-wide governments and regulators is so important for the standard organization in order to establish XBRL as the leader of all information sharing languages.

- Open Source: the source code of XBRL is available for everyone thanks to a license in which the copyright holder provides the rights to study, change and distribute the software to anyone and for any purpose. What it means that it is free if you have the knowledge enough to implement it in the way that solve your needs. This is so important for the community as everyone can adapt and customize the standard for their personal needs, in the best way it adapts.

- XBRL improves the quality and speed of information exchange, which enables company managers and directives to do better decision making and also enables them to share more accurate information between companies. Furthermore, the near real-time disclosure of information enables investors to do almost a real-time analysis.

- Business information tagged with XBRL can be converted into a variety of formats including HTML, Excel spreadsheets and databases. Companies can increase automated information sharing or information analysis with minimum costs as XBRL is so widely accepted.

- XBRL is not just a financial reporting tool: XBRL adapts well to a variety of uses. Although it is primarily used today for financial reporting, it can equally be used to share non-financial business information like inventory levels, production volumes, reseller sales and returns. Moreover, this standard can create new jobs, like XBRL consultants, which will help companies during the XBRL implementation process, or XBRL developers, that will create tools and frameworks to extract information from the documents tagged with XBRL and analyze it.

In conclusion, starting the XBRL tagging in a company is difficult during the startup phase due to its complexity, initial cost and other related problems, which are the main reason for the development of this project. But, despite this facts, the benefits that XBRL standard supply to its users in a not too distant future are worth it. Having accurate information, with an easier and more timely access to it, as well as, improving the speed of information exchange between companies, opens up a wide world of opportunities in which companies that follow the growth of the standard will have a great advantage over companies that decide to stay waiting to see the future of XBRL.

2.4 Alternatives to XBRL

In this new world that is coming up, XBRL is not the only player in the game. The concept of a standard language for financial reporting is not new, and XBRL is not the only one that wants to take advantage of this technology. XBRL's foremost impediments to universal adoption by businesses are associated with legacy EDI systems and other XML-based languages, as ebXML (extended business XML).

Electronic Data Interchange (EDI)[21] is the computer-to-computer exchange of business documents in a standard electronic format between business partners. It is an entrenched technology throughout the world for business transactions. EDI systems are quite difficult to learn and a lot of time is needed in order to edit and modify forms and reports. Moreover, a programmer familiar with BASIC, COBOL or C is required to make changes in an EDI system, and, since each EDI system is different, every programming task is not trivial.

This business communication system is a thread for XBRL due to the extensive and expensive EDI infrastructure that some companies already have. Modifying this infrastructure to accommodate XBRL-based reporting represents a risk for the businesses that they usually do not want to take. Furthermore, EDI does not have to face Internet problems, such as security or low-speed connectivity, as it uses dedicated networks for secure, dedicated connections for the transport of corporate data. Otherwise, even with the advantages of stability and an installed base, many EDI systems lack key features that XBRL will provide and the extensibility of a typical EDI system is low, meanwhile the main feature that distinguish XBRL is the extensibility. Instead of simply adding new tags or taxonomies, programmers must modify complex interfaces one by one, what it makes it not worth it.

Another thread that XBRL faces is from variations of its own language - XML- that are being applied to financial and business reporting. ebXML is positioned more as a replacement for traditional EDI systems than as a specific alternative to XBRL reporting. This variation of XML began as a worldwide business specification to migrate EDI applications and messages to XML. However, businesses found EDI expensive and difficult to implement. Thus, ebXML evolved and offers low cost data exchange capability using XML over Internet. ebXML[22] a technical framework enabling extensible markup language (XML) to be utilized for consistent enterprise data exchange. It is important to remark that, just as XBRL is a set of specifications, ebXML is not a software package or service but a language that can be used to create software products. As XBRL and ebXML have the common XML parent, they share many of the basic characteristics, as well as, some weaknesses, like security attacks.

The following picture shows the principal differences between XBRL, EDI systems and ebXML[23]:

[21] https://www.edibasics.com/what-is-edi/

[22] https://www.techopedia.com/definition/24197/electronic-business-xml--ebxml

[23] https://diblokdcma.files.wordpress.com/2010/03/john-wiley-sons-essentials-of-xbrl-financial-reporting-in-the-21st-c
pdf

EXHIBIT 2.7

Feature	XBRL	ebXML	Traditional EDI
Extensibility	High	High	Low
Penetration	Low	Low	Low
Network	Internet	Internet	VAN
Security	Moderate	Moderate	High
Cost/Installation	Low	Low	High
Geographical extent	Unlimited	Unlimited	Unlimited
Web compatible	Yes	Yes	No
Open system	Yes	Yes	No
Infrastructure	XML	XML	C/BASIC/COBOL
Stability	Evolving	Evolving	Stable
Flexibility	High	High	Low
Interfaces	Single	Single	Multiple
Business rules	Separate	Separate	Embedded
Standards	Industry	Industry	Corporation
Transaction sets	Variable	Variable	Fixed
Standards evolution	Moderate	Moderate	Slow
Fixed costs	Low	Low	High

Figure 2.2: Main differences between XBRL and its alternatives.

Finally, just two alternatives has been described, but, of course, XBRL is not the only format that data can be shared from place to place. There are lots of alternative formats that are sometimes preferred by regulators, government agencies and enterprises that need to collect and use significant quantities of reporting data, which are the following ones[24]:

- PDF: is heavily used for reporting. It allows the presentation defined by the report author to move around electronically, without alteration. PDF does not easily support system-to-system data transfer, which means that its use for highly reliable reporting is restricted.

- HTML: is the way that pages on the web are formatted and is a highly flexible and powerful format, and possesses a range of forms capabilities. HTML does not support system-to-system data transfer and involves custom programming to shift data from forms into receiving systems.

- XML: is certainly possible to develop sophisticated reporting solutions using XML, but third party software needs to be specially developed to support the specific vocabulary developed in the design of the solution.

- JSON: is a relatively new, and very popular electronic format, used to transmit data, generally as an alternative to XML. Its strength is its relative simplicity and performant nature.

- RDBMS: relational databases are the way the vast majority of Accounting and ERP systems manage information and are a vital part of most corpo-

[24] `https://www.xbrl.org/the-standard/what/the-standard-for-reporting/alternative-formats/`

rate and government systems. The main problem that RDBMS systems face is that they can not transmit data across different RDBMS systems.

Although this alternatives, XBRL has good odds in the near future to be the main business reporting tool as it is supported for hundreds of businesses, governments and institutions, and because it is an open, freely licensed standard supported by an international not-for-profit public-private consortium that maintains and brings up to date the standard.

2.5 Social responsibility of XBRL

Pollution, global warming, overpopulation, natural resource depletion, climate change, deforestation and more environmental problems concern the nowadays society. Some years ago, maybe they were a minor problem for most of the people, but now companies act responsibly with the environment and with the society in order to gain a differentiated competitive advantage. Moreover, apart from taking advantage from competitors with this strategies, executives act responsibly for their personal values. Corporate Social Responsibility, understood as the incorporation of actions and policies for the public good into a firm's business plan, is becoming the center of attention by stakeholders. These actions and policies are an important advantage for the good image of a company. Therefore, companies right around the world are both increasing their CSR initiatives and making an effort to report them. For this reason, CSR reporting is an area where structured data use is growing rapidly, and consequently, XBRL language used as a way of structuring data is becoming more important.
Related with this growth of the XBRL standard, there are three main issues that XBRL behaves towards with its digital reports: business transparency, sustainability reports and contributing with the fight against deforestation due to giving an alternative to hand-made reports.
Business transparency is not just about not doing "tricks" with the financial or accountability documents. It is about providing full accessibility to financial information, making it available to anyone who wants it; providing accurate and standardized data to improve the analysis and comparability for investors and regulators, because, as it is known, the transparency of financial reporting have a significant influence on investor's decisions; increasing consistency of business and financial information, because the information persists from its original source and persist in time as well; and finally, all the data that is required is provided in a clear and easy way, avoiding users the effort to dig deep into the information. XBRL satisfies all these requirements needed to provide transparency to data users.
Both business transparency and sustainability reports are included by GRI in various programs using XBRL as the reporting language. Global Reporting Initiative (GRI), is an independent international organization that has pioneered sustainability reporting since 1997. Accordingly to its web page `https://www.globalreporting.org/information/about-gri/Pages/default.aspx`, '*GRI helps businesses and governments worldwide to understand and communicate their impact on critical sustainability issues such as climate change, human rights, governance and social well-being. This enables real action to create social, environmental and economic benefits for everyone. The GRI Sustainability Reporting Standards are developed with true multi-stakeholder contributions and rooted in the public interest.The practice of disclosing sustainability information inspires accountability, helps identify and manage risks, and enables organizations to seize new opportunities. In addition, reporting with the GRI Standards supports companies, public and private, large and small, protect the environment and improve society, while at the same time thriving economically by improving*

governance and stakeholder relations, enhancing reputations and building trust'. As it was mentioned before, GRI initiated various programs in favor of business transparency. In accordance to its web page `https://www.globalreporting.org/services/preparation/Business_Transparency_Program/Pages/default.aspx`, '*GRI's Business Transparency Program supports groups of companies during their first reporting cycles, from introducing them to sustainability and transparency to hand-holding them in publishing their first reports. GRI worked on various projects under the Business Transparency Program, supporting more than 400 organizations since the program was launched in 2006*'. For further information, an overview of all the past project can be found in the URL above.
Talking about sustainability reporting, GRI launched its first XBRL taxonomy for the G3 guidelines in 2006. In accordance with its web page `https://www.globalreporting.org/information/g4/Pages/default.aspx`, *by using the GRI Guidelines, reporting organizations disclose their most critical impacts – be they positive or negative – on the environment, society and the economy. They can generate reliable, relevant and standardized information with which to assess opportunities and risks, and enable more informed decision-making – both within the business and among its stakeholders.* Later, in 2013, GRI launched the latest version, which covers G4, G3.1 and G3 Guidelines. This latests updates, were designed to give organizations better control over the quality and consistency of their sustainability performance data. GRI released its G4 XBRL Reports Program in 2014. Along with promoting the use of the G4 Guidelines in the GRI XBRL Taxonomy 2013, the Program increased interest in the Voluntary Filing Program and provided organizations with a number of examples of XBRL-tagged reports.
Finally, as it logically obvious, the digitalization of business reporting avoid an overuse of paper-format reports. And this, in turn, helps in reducing deforestation, which is one of the most worrying environmental issues after notices such as the deforestation of amazonian jungle or that fifty percent of the waste of businesses is composed of paper.

Chapter 3

Web Framework Development

The following chapter describes the development of the web framework, the main part of the project. This process is constituted by explaining the methodology, timing and budget of the project, which represent the first steps of a project plan. Then, the list of iterations is going to be described, with the requirements and screen-shoots showing how the framework works. Finally, the future work is going to be pointed out.

3.1 Methodology of the project

Like most of the software development projects that are done nowadays, this project follows an agile methodology. According to `https://linchpinseo.com/the-agile-method/`: *The Agile Method is a particular approach to project management that is utilized in software development. This method assists teams in responding to the unpredictability of constructing software. It uses incremental, iterative work sequences that are commonly known as sprints.* Each sprint or iteration (in the case of this project, sprints are going to be called iterations) has 5 steps:

- Define: Determine what work will be done in the current iteration.
- Design: Plan how to build the requirements into a product.
- Build: Make the design a reality.
- Test: Verify the product functions as designed.
- Release: Give the product to the customer.

In this project, there is not a team of developers and a real final client wherefore I am the "team of developers" and the "final client" that checks if all the

features needed are implemented correctly in the product. Therefore, there is not a release step in the project.
This kind of methodology was chosen due to it ensures not only that developers maintain focus on rapid delivery and value is optimized throughout the development process, but also it easily adapts to changing requirements throughout the process by measuring and evaluating the status of a project. At the end, even the product probably will not be the same as the first idea of the client, this will fulfill all the expectations and will have all the desired features, resulting in the most competitive product that it could be. Moreover, this methodology help unexperienced project managers, as they can adapt their project plan while this is under development, and the first idea, probably an incomplete one, does not have to be a definitive scheme of the project.
The last feature that encompasses the methodology of project are the frameworks, programs and services that have been used for the development of the project. Some of them were mentioned in the section "State of the art", but now their specific use is going to be described. Throughout the entire project, *git* has been used as the version control system. The platform *GitHub* is used to store the source code in the cloud and synchronize it with the code editor used to implement the financial tool. Therefore all the code is available in the next website: `https://github.com/acs17/TFG-Aleix`. Regarding the code editor *Visual Studio Code* has been used due to it allows users to work with Angular projects and also allows the Angular CLI (Command Line Interface), which is the quickest and easiest way to get started with a new Angular 5 project as it is a tool to initialize, develop, scaffold and maintain Angular applications. Finally, *TinyMCE* has been used as the on-line editor inside the web framework because of its plugins that work with Angular applications.

3.2 Budget of the project

One of the key steps of any project plan is to create a budget proposal for the product. In the case of this project, the budget proposal will be a simulation as there is not a final client to sell the product and the costs are an estimate of the average costs established in the software development sector. I mean, as it is not a company who is developing this project wherefore there is not a lists of costs predetermined, a general approach of the costs needs to be taken to establish a reasonable price for the product and service.
First, an activity chart is going to be shown, which makes the different work done in each month clear. Then, a budget chart will illustrate all the work done with numbers, presenting the definitive costs for the project.

	February		March				April				May				June	
Activities	Weeks															
	February		March				April				May				June	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Research	X	X	X	X	-	X	X	-	X	X	X	-	-	-	X	X
Practical Training	X	X	X	X	-	-	-	-	X	-	-	-	X	X	-	-
Implement	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	-
Test	-	-	-	-	X	X	-	-	X	X	-	-	X	X	X	-
Document	-	-	X	X	X	X	-	-	X	X	X	X	X	X	X	X

Figure 3.1: Activity diagram.

In order to clarify which tasks includes each activity, below is shown a brief explanation:

- Research: work done on an extensive investigation about the XBRL standard and related topics to it.
- Practical training: word done on realizing tutorials of the frameworks used as Angular, tools used as TinyMCE, and languages as HTML, XML, CSS and more.
- Implement: work done on developing the web framework.
- Test: work done on probing the correct behavior of the web framework and its functionalities.
- Document: work done on reporting all the information related to the project.

Component	February	March	April	May	June	Quantity	Cost	Total Cost
	Personnel							
Software developer	36h	126h	126h	90h	54h	432h	7.5eur/h	3.240eur
Quality analyst		36h	36h	36h	18h	126h	6eur/h	756eur
Documenter		72h	36h	72h	36h	216h	5eur/h	1080eur
	Hardware							
Depreciation of computer equipment by the developer	36h	126h	126h	90h	54h	432h	0.5	216eur
Depreciation of computer equipment by the analyst		36h	36h	36h	18h	126h	0.5	63eur
Depreciation of computer equipment by the documenter		72h	36h	72h	36h	216h	0.3	64.8eur
TOTAL		Hours dedicated		774		Cost		5419.8eur

Figure 3.2: Budget of the project.

Finally, it is important to remark that each "X" of the figure 3.1 correspond to eighteen hours of work per week, divided in three hours per six days. Furthermore, the time dedicated to practical training has not been included in the budget, as it is considered as self learning. The work done by the developer correspond to the research and implementation sections, the work done by the analyst correspond to the testing section and the work done by the documenter is the document section. So, the definitive numbers that can be concluded are: 774 hours dedicated between the developer, analyst and documenter, and the final cost of the project is approximately 5.420 Eur.

3.3 Project timing

At the beginning of the project, a project timing was created in order to define a project plan to follow during the development/implementation process. Obviously, as the project works with an agile methodology, as it was mentioned before, the requirements have been changing at the end of each iteration and, consequently, the project timing created has been losing accuracy after every sprint. The requirements of the lasts iterations developed in the final project are different from the requirements thought in the project timing, so below is shown the first version and last version of it, in order to get the idea of what the web framework was thought to be and what it has finally been.

ITERATION	INITIAL DATE	FINAL DATE	WORK TO DO
0 - Beginning of the project	15/02/2018	06/2018	
1 - Previous work	15/02/2018	28/02/2018	Realization of tutorials, installing the programs and frameworks, searching information about the standard and other topics related to the project.
2 - Save and show an html report	01/03/2018	15/03/2018	First version of the project. Creation of the web framework where an html report will be received as the input and this will be shown through the TinyMCE editor.
3 - Add tagging functionality	16/03/2018	22/04/2018	Add the tagging functionality within the TinyMCE editor, using a custom taxonomy based on the "Pérdidas y Ganancias del Plan General Contable para Pymes".
4 - Add excel format functionality	23/04/2018	06/05/2018	Allow as input not only the html format but xls format as well.
5 - Add output functionality	06/05/2018	20/05/2018	Allow users to download their reports.
6 - Debug the code, add style and define future work	21/05/2018	06/2018	Decide what have to be done in the future to improve the web framework. Debug the code and add a css style.
7 - Documentation *	15/02/2018	06/2018	Documentation of the development of the web framework. Done during all the project.

Figure 3.3: Version 1 project timing.

ITERATION	INITIAL DATE	FINAL DATE	WORK TO DO
0 - Beginning of the project	15/02/2018	06/2018	
1 - Previous work	15/02/2018	28/02/2018	Realization of tutorials, installing the programs and frameworks, searching information about the standard and other topics related to the project.
2- Create an instance of the TinyMCE editor	01/03/2018	15/03/2018	Implement the interface of the web framework and create an instance of the TinyMCE editor to work on it.
3 - Save and show an html report	16/03/2018	31/03/2018	Add the input field where an html report will be received as the input and this will be shown through the TinyMCE editor.
4 - Save and show a report from an URL	01/04/2018	15/04/2018	Add another input field where a report from an URL will be received as the input and this will be shown through the TinyMCE editor.
5 - Add tagging functionality	16/04/2018	05/05/2018	Add the tagging functionality within the TinyMCE editor, using a custom taxonomy based on the "Pérdidas y Ganancias del Plan General Contable para Pymes".
6 - Improvements of tagging functionality	05/05/2018	08/05/2018	Improve the tagging functionality (creating context menu).
7 - Create samples of "PyG" and "Balance"	08/05/2018	10/05/2018	Create two html documents which contain the samples of a "PyG" report and a "Balance" report.
8 - Show tags	11/05/2018	17/05/2018	Show the information of the tags introduced by the user.
9 - Add buttons to define Context and Currency	18/05/2018	27/05/2018	Add buttons to define the context and the currency of the tags that users introduce.
10 - Debug the code, add style and define future work	28/05/2018	06/2018	Decide what have to be done in the future to improve the web framework. Debug the code and add a css style
11 - Documentation *	15/02/2018	06/2018	Documentation of the development of the web framework. Done during all the project.

Figure 3.4: Version 2 project timing.

As it can be seen, the requirements of the Figure 3.3, which were thought to be indispensable, are not all developed at the end. The first steps were clear, but while the project was built up and the web framework was tested, a need to change was almost forced. In addition, in the Figure 3.4, there are six more requirements (four new requirements and two changed from the first version), what proves that the agile methodology was well used during the project.
Regarding the deadlines, taking the last version of the project timing as reference, we can conclude that the first three iterations met the target dates, but

the fourth spring was delayed one week. Some problems were found trying to save a report from an URL, which are going to be described in the next section, and also, it was exams period, what made difficult to met the deadline. The next three iterations (5, 6, 7) have kept this delayed week compared to their corresponding delivery date, but the next one (8) was released at the same time that the ninth iteration, thus recovering the week of delay and delivering it four days before the deadline. The last spring (10), did not have an exact deadline as there were not deliverables thereby its work consist on debugging the code, defining the future work and adding a css style. Finally, the documentation spring was made during all the project, despite the fact that most of it has been done during the month of June.

3.4 List of iterations

The following section describes the main issues dealt with in each iteration. Moreover, the inconveniences that have been found along with their solutions are going to be explained. It is going to be explained in a very visual and not-technical form, as this project mixes a target public objective, the ones who knows business management aspects and the ones that knows computer engineering aspects. By this way, the implementation of this financial tool is going to be more clear and understandable for everyone.

3.4.1 Iteration 0: Beginning of the project

The project started the 15th of February after a meeting with the tutor of this project and author of the project's proposal. He described me his idea and gave me reasons for why he thought his proposal was attractive to develop. In addition, the scope of the project and its main functionalities were also defined and described in order to clarify the work that was needed to be done. Finally, the deadline of the project was fixed on the fifteenth of June, accepting that there would be part of the implementation that would be left as future work.

3.4.2 Iteration 1: Previous work

In order to start with the implementation of the project, a previous work was needed. This consisted on installing the programs and frameworks used, like Visual Studio Code and Angular, and also creating the repository on the platform GitHub. Moreover, I have done some tutorials to refresh the knowledge of languages such as Javascript or HTML, and to learn new languages as XML and CSS, as well as, tutorials of developing Angular applications. The following list are some of the tutorials done during learning stage:

- Angular: an extern website tutorial `https://coursetro.com/courses/19/Learn-Angular-5-from-Scratch---Angular-5-Tutorial`.
- Angular: a tutorial from its website `https://angular.io/tutorial`[].
- Angular: a Youtube video which introduces it `https://www.youtube.com/watch?v=0eWrpsCLMJQ&list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ`.
- HTML: a tutorial from w3schools `https://www.w3schools.com/html/default.asp`.
- CSS: a tutorial from w3schools `https://www.w3schools.com/css/default.asp`.
- XML: a tutorial from w3schools to understand also the basics of the standard XBRL `https://www.w3schools.com/xml/default.asp`.

In addition, throughout all the project, I had to consult the official documentation website of Angular: `https://angular.io/` and also of TinyMCE: `https://www.tinymce.com/`.
Finally, the last part of work done on this spring was investigate and research information about the XBRL standard, as I could not start a project based on this standard without having a consolidated idea of its scope and its main functionalities and different uses. All the pages used to obtain this information are written in the bibliography section.

3.4.3 Iteration 2: Create an instance of the TinyMCE editor

3.4.3.1 Requirements

First and obviously, it was needed to create the Angular-CLI project and structure it. Angular structures its projects through components, which are the basic building blocks of the application. This project is structured in two components: the home component and the work component.
Then, in order to start working with the digital reports of the clients of the application, an online html editor was necessary. TinyMCE is the one that offers better features and options to work on. It allows developers to custom almost everything, such as the menu toolbar, enable and disable plugins or create a context menu.

3.4.3.2 Implementation

Creating the project was a systematic work due to the Angular-CLI. A list of commands was followed during the installation and structuring of the project. There are other commands to configure the Angular CLI Options but it is not needed to go further as they were not used in this project.

1. Install: *$ npm install @angular/cli -g*

2. Create the project: *$ ng new my-new-project –style=scss –routing*

3. Create a new component: *$ ng generate component home*

Regarding the creation of an instance of the TinyMCE editor, the HTML tag $< angular - tinymce >< /angular - tinymce >$ is used. Inside this tag, the configuration and content are set. The figure 3.5 shows the final appearance of the application with the editor.

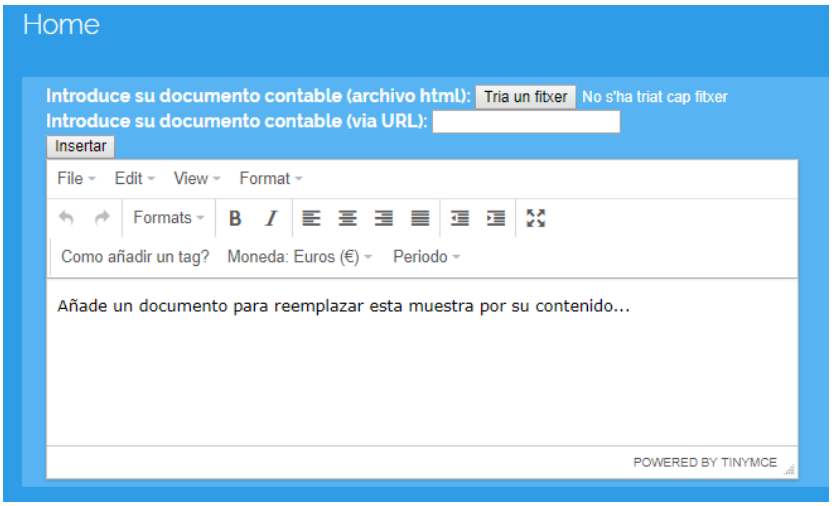

Figure 3.5: Instance of the TinyMCE editor

3.4.3.3 Problems encountered

Throughout this iteration a problem with the creation of the TinyMCE instance was dealt with. In the official documentation of the editor, it appears a different approach to initialize the instance, which results incorrect for this project. It was the following:
$< script > tinymce.init(\{selector :' \#mytextarea'\}); < /script >$
Therefore, as we mentioned, it is simpler to use the html tag of the TinyMCE editor than creating a script inside the html file which initializes the instance.

3.4.4 Iteration 3 & 4: Save and show a report, in HTML and from an URL

3.4.4.1 Requirements

The first functionality, regarding which input would allow the web framework, consists on working with HTML reports. SMEs already have their financial reports in a digital format, as they have to present this documents to the official filing organization: the *Colegio de Registradores*. Therefore, it is easy for them to introduce as input a report in an HTML format, add the tags and obtain the desired output. Although this functionality is useful, easy and simple, it does not provide a service for all SME. Because of that, the financial tool also accepts as input a report from an URL. This is helpful for those companies that work with other web frameworks to create their reports, as they can take advantage of all the functionalities without wasting time to save their reports in HTML format. Moreover, it is thought to implement more input formats in the future work, such as .xls, in order to expand the possibilities offered to users.

3.4.4.2 Implementation

To accomplish the requirements of the springs, first it is necessary to capture users input, and then, save it and show it as the content of the TinyMCE editor. In order to capture the users html report, an input element is used, the type of which is fixed to HTML for avoiding other formats. Also an input element is used to capture reports from URLs.

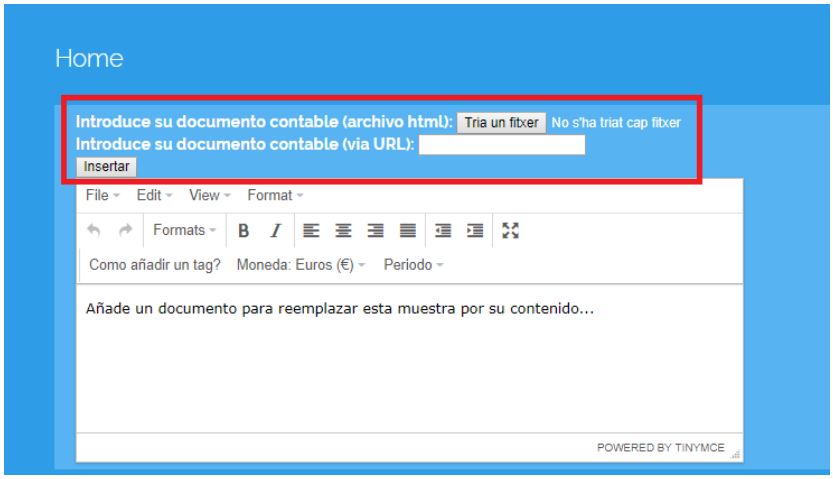

Figure 3.6: Input elements

Then, two different functions are used:

- To work with the HTML report, it is used the function loadFile(input), which creates an EventListener. This binds an event to a specific object, in this case the input, what results in representing the html report as the content of the TinyMCE editor.
- To work with the report from an URL, it is used a service from Angular called urlService and a function called getUrl(). Services are a great way to share information among classes that do not know each other. So the service is used to get the url that users introduce as input, what creates an Observable; and the function is utilized to subscribe to that Observable and represent the report from the url as the content of the TinyMCE editor.

3.4.4.3 Problems encountered

Basically, the problems have been caused by the url functionality. First of all, everything was tried to be done in the work component, but problems with the http get request appeared, what did not allow to create the Observable. Then, after creating the service and solving this initial problem, another

drawback had to be faced: a problem with the CORS configuration. According to the website `https://developer.mozilla.org/en-US/docs/Web/HTTP/CORS`: Cross-Origin Resource Sharing (CORS) is a mechanism that uses additional HTTP headers to tell a browser to let a web application running at one origin (domain) have permission to access selected resources from a server at a different origin. So, to solve this problem, an extra header was needed, which was added at the beginning of the http get request. To understand better this problem with the urlService, the figure 3.7 shows the source code:

```
1  import { Injectable } from '@angular/core';
2  import { HttpClient, HttpHeaders } from '@angular/common/http';
3  import { Observable } from 'rxjs/Observable';
4
5  @Injectable()
6  export class UrlService {
7
8    private PROXY = 'http://crossorigin.me/';
9
10   constructor(private http: HttpClient) { }
11
12   getFileByUrl(input): Observable<string>{
13     console.log(input);
14     return this.http.get(this.PROXY + input, { responseType: 'text' });
15   }
16 }
17
```

Figure 3.7: urlService code

3.4.5 Iteration 5 & 6: Add tagging functionality and improvements of it

3.4.5.1 Requirements

At this point of the project, when the report has been introduced as input and it is shown as the content of the TinyMCE editor, is time to implement the tagging functionality. It is the main functionality of the web framework, which gives meaning to the project. Therefore, users have to be able to select a concept that they want to tag and add the tag with the correct taxonomy and the correct elements. In order to ensure that the tags used are correct, it has been used the: *Plan General Contable de Pequeñas y Medianas Empresas (PGC-PYMES)*. It is necessary to remark that the tagging functionality for the moment is prepared for two of the four documents of the annual accounts, which are asked to officially be submitted by the SMEs. The documents that have the tagging feature enabled are the *Balance* and *la cuenta de Pérdidas y Ganancias*.

3.4.5.2 Implementation

The standard XBRL allows to work with existent taxonomies, which define concepts as the currency, period and the correct name of the concept itself.

However, this project does not include any taxonomy provided by the XBRL consortium and works with a fixed "custom taxonomy" elaborated with the PGC-PYMES, which defines the correct name of the concept through a context menu. In addition, a custom button in the toolbar has been added, that explains unexperienced users how to tag in 4 easy steps.
This functionality has been implemented through the configuration of the TinyMCE editor, adding custom buttons and a context menu; and with a function called tagSelection(tagName), see figure 3.8:

```
tagSelection(tagName) {
    const selectedRange = this.editor.selection.getRng(true);
    if (selectedRange.cloneContents().textContent.length > 0) {
      const highlightNode = document.createElement('span');
      const xbrlNode = document.createElement('ix:nonfraction');
      var popup = 'id: xbrl  nombre:' + tagName + '  moneda:' + this.auxMoneda
                                                + '  periodo:' + this.auxPeriodo;
      xbrlNode.setAttribute('id', 'xbrl');
      xbrlNode.setAttribute('name', tagName);
      xbrlNode.setAttribute('unit', this.auxMoneda);
      xbrlNode.setAttribute('periodo', this.auxPeriodo);
      highlightNode.style.cssText = 'background-color: yellow';
      highlightNode.setAttribute('title', popup);
      try {
        selectedRange.surroundContents(xbrlNode);
        selectedRange.surroundContents(highlightNode);
      } catch (e) {
        alert('Lo siento, selecciona solo un valor para taggear');
      }
    } else {
      alert("Lo siento, selecciona algun valor para taggear");
    }
    console.log(selectedRange);
}
```

Figure 3.8: Function tagSelection(tagName)

A summary of what does this function is to check if there is a selected concept. If nothing is selected, ask the user to select a concept to tag. Otherwise, if there is a selected concept, it creates two constant variables, which represent two different hmtl elements: the first one ('span'), is going to be explained in the eighth iteration related with showing the tags, and the second one ('ix:nonfraction') creates the iXBRL element, in which some attributes are set such as id, name, unit and period. Finally, inside the try - catch structure, embeds this new elements with the selected concept or ask to select just one concept, in the case there is more than one selected. The iXBRL element is a nonFraction element because it denotes an **XBRL numeric** item, and has various properties like id, name, unitRef and contextRef, which are the ones used to create a tag in this project. All the iXBRL elements can be found in the iXBRL specification website `http://www.xbrl.org/specification/inlinexbrl-part1/rec-2013-11-18/inlinexbrl-part1-rec-2013-11-18.html#sec-intro`.

3.4.5.3 Problems encountered

Throughout this spring, the main problem dealt with was how the tagging functionality was going to be structured. The first approach in order to implement this feature was to create a custom button in the toolbar menu, which would allow users to select a concept and after that would click on the "tag button" to finish the tagging process. This wasn't possible as the selected concept changes automatically to unselected when users click on the "tag button". Secondly, another option thought was to enable a context menu button, which would appear after using the right-click. But as it is a web framework, when users right-clicked a concept inside the online editor, the web browser context menu appeared. After searching for a solution, a plugin from TinyMCE website was found, which enables a self-context menu called *contextmenu*. This plugin needs to be configured inside the main configuration of the TinyMCE editor.

```
constructor(private http:HttpClient, private urlService:UrlService) {
  this.customSettings = tinymceDefaultSettings();
  this.customSettings.plugins = 'autoresize fullscreen contextmenu';
  this.customSettings.resize = 'both';
  this.customSettings.toolbar = 'undo redo | styleselect | bold italic | alignleft aligncenter alignright alignjustify
                                 | bullist numlist outdent indent | fullscreen | howToTag moneda periodo';
  this.customSettings.contextmenu_never_use_native = true;
  this.customSettings.contextmenu = 'perdidasYGanancias balance';
  this.customSettings.setup = this.setupTinyMCE.bind(this);
}

setupTinyMCE(editor){
  var that = this;
  this.auxMoneda = 'EUR';
  this.auxPeriodo = 'Periodo'
  this.editor = editor;
  this.editor.addButton('howToTag',{
    text:'Como añadir un tag?',
    onclick: function(){
      alert("Para añadir un tag -> 0) Seleccione la moneda y el periodo sobre el cual trabaja este documento  1)Subraya el valor del concepto
    }
  });
  this.editor.addButton('periodo',{···
  });
  this.editor.addButton('moneda',{···
  });
  this.editor.addMenuItem('perdidasYGanancias', {···
  });
```

Figure 3.9: Configuration and Setup of the TinyMCE editor

In the figure 3.9 appears the configuration of the TinyMCE editor, such as the plugins, toolbar buttons and the context menu, as well as the setting up of the editor, where the custom buttons "moneda", "periodo" or the custom context menu, with the concepts of "Plan General Contable", are implemented. Therefore, the main problem of the main functionality of the financial tool was solved due to a plugin.

3.4.6 Iteration 7: Create samples of "PyG" and "Balance"

Firstly, all the functionalities created until the moment were tested with some reports from URLs found in Internet. But as the project was taking shape, samples of the documents were necessary in order to test the financial tool. Since the application works with html files and URLs, a sample of each type of document of the annual accounts has been created in html type, see figures 3.10 and 3.11.
The following numbers are made-up ones, completely irrelevant and that do not come from any company, just created to test the functionalities of this financial tool.

Comptes Anuals: Balanç

ACTIU	2018	2017
A)Actiu No Corrent		
Immobilitzat intangible	5	8
Immobilitzat material	7	4
Inversions immobiliàries	26	14
Inversions en empreses del grup a llarg termini	10	19
B)Actiu Corrent		
Existències	12	18
Deutors comercials	15	10
Inversions en empreses del grup a curt termini	8	2
Efectiu	7	5
PATRIMONI NET I PASSIU		
A) Patrimonio Neto		
Fons propis	15	22
Subvencions	9	7
B) Passiu No Corrent		
Provisions	18	9
Deutes a llarg termini	7	4

Figure 3.10: "Balance" document sample

Comptes Anuals: Pérdues i Guanys

Pérdues i guanys	2018	2017
Import net de la xifra de negocis	25	20
Variació d'existències	(15)	(18)
Treballs fets per l'empresa	5	4
Aprovisionaments	12	14
Despeses d'explotació	(20)	(19)
A) Resultat d'explotació	**7**	**1**
Ingressos Financers	16	18
Despeses Financeres	(18)	(15)
Diferències de canvi	3	2
Deterioraments	(4)	(3)
B) Resultat Financer	**(3)**	**2**
C) Resultat abans d'impostos	**4**	**3**
Impostos sobre beneficis	(1)	(1)
D) Resultat Exercici	**3**	**2**

Figure 3.11: "Pérdidas y Ganancias" document sample

3.4.7 Iteration 8: Show tags

3.4.7.1 Requirements

Some companies can have pages and pages of financial documents that need to be tagged. For this reason, it could be helpful for users to see what they have already tagged not only to do not try to tag again the same concept, but also to see if the tag that they have done is correct. Therefore, when the process of tagging is done, the selected concept needs to stay highlighted and when the user puts the mouse on it, information of the tag has to be shown.

3.4.7.2 Implementation

As it can be seen in the figure 3.8 in the section 3.4.5: Iteration 5 & 6, the same function used to tag has been used to implement this new feature. So, a new html element is created , saved in a constant variable. This element is a span element, which is used to add a hook to a part of a text or to a part of a document. Inside this variable, the css style is set, changing the background color to yellow, and the attribute title it is initialized with another

variable called popup, which contains all the information of the tag. Finally, this consant variable is added to the selected concept, which inherits the tags that add the correct and desired functionality.
The figure 3.12 shows the example of a tagged concept, highlighted and showing the information of the tag.

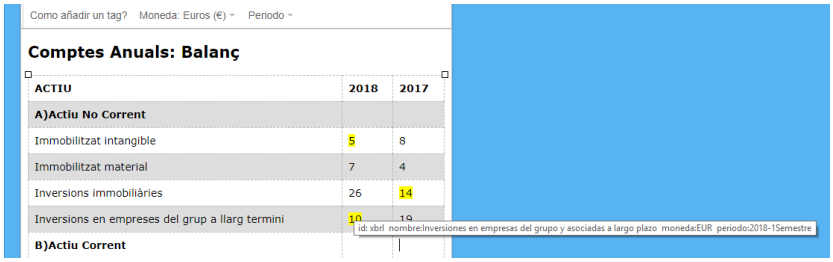

Figure 3.12: Show highlighted concepts

3.4.8 Iteration 9: Add custom buttons to define Context and Currency

3.4.8.1 Requirements

Concepts without context information make no sense for almost everyone except of the person who has done the report and even this one can be confused of what concepts mean. For that reason, it is important for the consumers of information, such as investors, regulators, etc, to have information displayed as concept-context tuples. Context information can be extensive and diverse, giving users information about the currency, period of time, name, id, decimals, precision, scale and lots more. This project has focused only to the basic context information, currency and period of time, because they both give enough meaning to the users.

3.4.8.2 Implementation

The same implementation has been done for both custom buttons. This spring has been simple and quick to do, as TinyMCE gives a lot of flexibility to create custom buttons and to configure the editor. Basically, what it has been done is adding the name of the buttons in the toolbar configuration that can be seen in the figure 3.9. Then, in the setup function, a new button is created in the editor, initializing the name and the function that this button has to do. In this case, the buttons have to save the option that users select into a variable, which is added in the context information included in the tags. The figure 3.13 shows the function that adds a custom button, specifically the currency button.

```
this.editor.addButton('moneda',{
  type:'listbox',
  text:'Moneda',
  onselect: function() {
    that.auxMoneda = this.value();
  },
  values:[
    {text:'Moneda: Dolares ($)', value:'USD'},
    {text:'Moneda: Euros (€)', value:'EUR'},
    {text:'Moneda: Libras (£)', value:'GBP'}
  ],
  onPostRender: function(){
    this.value('EUR');
  }
});
```

Figure 3.13: Add custom button into the editor

3.4.9 Iteration 10 & 11

To conclude the list of iterations, mention that iteration 10 consists on debugging the code, what does not need further explanation, adding css style that has been used a sample from Internet and defining the future work, that is going to be explained in the following section. Finally, the documentation iteration does not need any explanation neither, as the requirement is obvious: create a set of documents or a single document that accompanies the web framework and explains how it has been done and how it operates.

Chapter 4

Conclusions

4.1 Reflexions

At the end of the project, is time to be self-critical and analyze what have been done correctly and what could have been done better.
First of all, it has been a great decision to work in an agile methodology since it has forced me to work continuously, being committed to the milestones. However, from my point of view I think I should have started earlier this project but for different personal reasons, that has not been possible. With more time I would have been able to study deeper various aspects from the project and to expand the range of functionalities of the web framework, even I am satisfied with the final result.
Secondly, thanks to this project, I have realized that it is so difficult to follow a project timing and being able to adapt to changes is crucial for the success of every project.
Finally, another aspect that I think that it could have been done better is the documentation of the project. While I was implementing the source code of the financial tool, I reserved some time to do the documentation of the information researched about the XBRL standard, but I did not document the implementation of the web framework until the end of it. It would have been better to do the documentation of each iteration at the end of it because the work done and the problems that have been solved are clearer than at the end of all the project.

4.2 Future work

As it has been mentioned in previous sections this project has the main functionalities that are necessary to do the XBRL tagging process, but some other work can be done in a short future in order to expand the range of functionalities offered to users. Some of the new features that could be useful for the financial tool are the following:

- **Introduce the functionality for all the documents of the annual accounts**: as it was mentioned before, the actual version of the financial tool works with two of the four documents asked to fill by SMEs in the annual accounts. The first future step should be expand the functionality to all the documents required.

- **Include more formats as input**: for those companies that use the Office pack or similar, it would be very helpful to allow .xls and other formats as input. Providing all kind of formats lets users have faster and better experiences with the tagging tool.

- **Output functionality**: allow users to save their reports with the XBRL tags, which could be used in other softwares to analyze the information or just to share that XBRL reports with enterprises of the group or other external companies.

- **Launch the financial tool**: after all the new developments of the web framework, the final objective is to launch the tagging application to the market. After studying the possibilities of the product and the target market, everything indicates that this financial tool could be successful nowadays. Of course, a marketing plan is going to be necessary and the application must have been tested to ensure the correct performance of all the functionalities.

4.3 Conclusion

To conclude this project I am going to analyze the objectives established at the beginning of it. The first and main objective of the project was to became familiar with the web development software Angular, and with the various programming languages used throughout this project. After all the hours worked with it, I would dare say that I am not a master of Angular but I could manage most of the functionalities and the general operational of the software. Moreover, I fell more confident with my programming skills after this project, specially with the languages used. This knowledge may help me in my professional career if someday I am asked to work with this software or languages.
The second objective was to understand the scope of the standard XBRL. The learning process has not been difficult but stingy. There is a lot of information in the Internet about XBRL, from the official website of the consortium, from collaborating companies and organizations or notices from blogs and online newspapers. Therefore, it has been difficult to synthesize and summarize all the information. However, I think that the Chapter 2 is understandable enough for everyone to grasp the main idea of the XBRL's scope.
The last objective was to plan and follow an agile methodology. From my point of view, I achieved this objective, maybe with some delay in some of the iterations, but always trying to meet the deadlines and to implement the work that was programmed to do in each spring. Moreover, I adapt the iterations to the

changes that appeared during the project, changing the features or whatever was necessary to enhance the final result.
Finally, remark that I am proud of my work done throughout the project and I feel satisfied and fulfilled with this web framework development as my last task of the double degree.

Bibliography

[Agile Methodology, 2018a] Agile Methodology (2018a). Beginners Guide of Agile, https://linchpinseo.com/the-agile-method/.

[Agile Methodology, 2018b] Agile Methodology (2018b). Overview, Definition & Steps, https://study.com/academy/lesson/what-is-agile-methodology-overview-definition-steps.html.

[Aman Bahri, 2017] Aman Bahri (2017). PROS AND CONS OF XBRL (A NEW ERA IN THE FIELD OF COMMERCE). *INTERNATIONAL JOURNAL OF BUSINESS MANAGEMENT AND SCIENTIFIC RESEARCH*, 30.

[Angular Documentation, 2018] Angular Documentation (2018). Official Documentation -https://angular.io/guide/quickstart.

[Angular tutorial, 2018] Angular tutorial (2018). Learn Angular 5 from Scratch, https://coursetro.com/courses/19/Learn-Angular-5-from-Scratch—Angular-5-Tutorial.

[Bergeron, 2077] Bergeron, B. (2077). sou.pdf.

[Bergeron, 2003] Bergeron, B. P. (2003). *Essentials of XBRL : financial reporting in the 21st century*. Wiley.

[Digital Transformation, 2018] Digital Transformation (2018). Digitization of Business Processes, http://www.elma-bpm.com/2017/08/31/digital-transformation-digitization-of-business-processes/.

[Digitalization, 2018] Digitalization (2018). Digitalization process, https://www.worldatlas.com/articles/what-was-the-digital-revolution.html.

[ebXML, 2018] ebXML (2018). What is Electronic Business XML (ebXML), https://www.techopedia.com/definition/24197/electronic-business-xml–ebxml.

[EDI, 2018] EDI (2018). What is EDI (Electronic Data Interchange), https://www.edibasics.com/what-is-edi/.

[Enachi and Andone, 2015] Enachi, M. and Andone, I. I. (2015). The Progress of XBRL in Europe – Projects, Users and Prospects. *Procedia Economics and Finance*, 20:185–192.

[ESMA, 2018] ESMA (2018). European Securities and Markets Authority, https://www.esma.europa.eu/.

[GRI, 2018] GRI (2018). Global Reporting Initiative, https://www.globalreporting.org/Pages/default.aspx.

[Kernan, 2018] Kernan, K. (2018). The story of our new language Personalities, cultures, and politics combine to create a common, global language for business.

[McKinsey & Company, 2018] McKinsey & Company (2018). Accelerating the digitization of business processes, https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/accelerating-the-digitization-of-business-processes.

[Potential Uses XBRL, 2018] Potential Uses XBRL (2018). Benefits and Potential Uses of XBRL, https://www.aicpa.org/interestareas/frc/accountingfinancialreporting/xbrl/benefitsandpotentialuseso

[Pros and Cons XBRL, 2018a] Pros and Cons XBRL (2018a). Disadvantages of Using XBRL, https://www.techwalla.com/articles/disadvantages-of-using-xbrl.

[Pros and Cons XBRL, 2018b] Pros and Cons XBRL (2018b). The XBRL Business Reporting Blog: Some of the Pros and Cons of XBRL, http://xbrl-reporting.blogspot.com.es/2011/02/some-of-pros-and-cons-of-xbrl.html.

[SEC, 2018] SEC (2018). U.S Securities and Exchange Commission, https://www.sec.gov/.

[Stack Overflow, 2018] Stack Overflow (2018). Stack Overflow, https://stackoverflow.com/.

[TinyMCE, 2018] TinyMCE (2018). The Most Advanced WYSIWYG HTML Editor, https://www.tinymce.com/.

[W3schools, 2018] W3schools (2018). Online Web Tutorials, https://www.w3schools.com/.

[XBRL Around the World,] XBRL Around the World. XBRL Around the World, https://www.journalofaccountancy.com/Issues/2008/Oct/XBRLAroundTheWorld.htm.

[XBRL Benefits, 2018] XBRL Benefits (2018). XBRL Benefits, https://ca.xbrl.org/xbrl-benefits/.

[XBRL Consortium, 2018] XBRL Consortium (2018). https://www.xbrl.org/.

[XBRL Demo, 2018] XBRL Demo (2018). http://store.itpreneurs.com/demo/XBRL/24022012102709xbrl-foundation-demo/index.html.

[XBRL Education, 2018] XBRL Education (2018). http://xbrleducation.com/.

[XBRL España, 2018] XBRL España (2018). Asociación XBRL España, especificaciones de un estándar abierto para el sector financiero, http://www.xbrl.es/es/xbrl-especificaciones-de-un-estandar-abierto-para-el-sector-financiero/.

[XBRL Specifications, 2018] XBRL Specifications (2018). The XBRL Standard, https://specifications.xbrl.org/.

[XBRL USA, 2018] XBRL USA (2018). XBRL Increases Transparency, https://xbrlusa.wordpress.com/2010/05/09/xbrl-increases-transparency/.